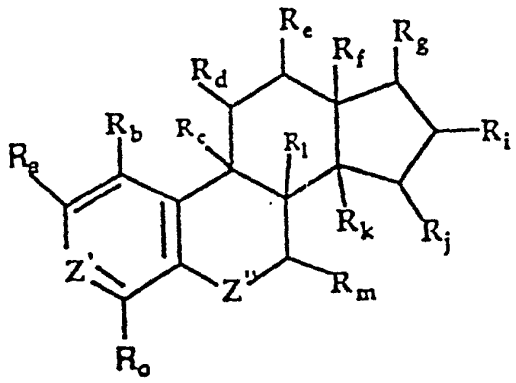
Claims

1. A method for treating a mammalian disease characterized by abnormal cell mitosis, said method comprising administering to a mammal a cell-mitosis-inhibiting compound of the formula below, said compound being administered in an amount sufficient to inhibit cell mitosis:



wherein:

I. R_a-R_o are defined as follows:

A) each R_a, R_b, R_c, R_d, R_e, R_f, R_i, R_j, R_k, R_l, R_m, R_o, independently is $-R_1$, $-OR_1$,

$-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_g is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$, or $-C\equiv CH$;

or

B) each R_a, R_b, R_c, R_f, R_k, R_l, R_o, independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and each R_d, R_e, R_i, R_j, R_m, independently is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$; and R_g is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$, or $-C\equiv CH$;

and

II. Z′ is defined as follows:

A) Z′ is X, where X is $>COR_1$, $>CC(=O)-R_1$, $>CC(=O)-OR_1$, $>CC(OH)-R_1$, $>CC(OH)-OR_1$;

or

B) Z′ is $=C(R_n)-X'-$ or $-X'-C(R_n)=$, where R_n is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$; and X′ is X, as defined above; or X′ is $>C=O$;

and

III. Z" is defined as follows:

A) Z" is Y, where Y is $-O-$, $-N-$, $>CHR_1$, $>C=O$, $>C(R_1)-(CH_2)_nOR_2$,

$>C-(CH_2)_n-CR_2$, $>C-(CH_2)_n-C-OR_2$,

$>C-(CH_2)_n-CHR_2$, $>C-(CH_2)_n-CH-OR_2$,

$>C-NH(CH_2)_n-CR_2$, $>C-NH(CH_2)_n-CHR_2$,

$>C-NH(CH_2)_n-CH-OR_2$,

$>C-NH(CH_2)_n-C-OR_2$, $>C-NH(CH_2)_n-OR_2$

$>C-NH(CH_2)_n-R_2$, $>C(CH_2)_nNHCR_2$,

$>C-(CH_2)_n-NHC-OR_2$,

$>C-(CH_2)_n-NH-CHR_2$, $>C-(CH_2)_n-NH-COR_2$, or

$>C-(CH_2)_n-NH-CH_2OR_2$, where n is 0-6;

or

B) Z" is $-Y-CH-$ or $-CH-Y-$ where R_p is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;

and

IV. provided that when each R_b, R_c, R_d, R_e, R_i, R_j, R_k, R_l, R_m and R_o is H;

R_f is $-CH_3$;

R_g is -OH;

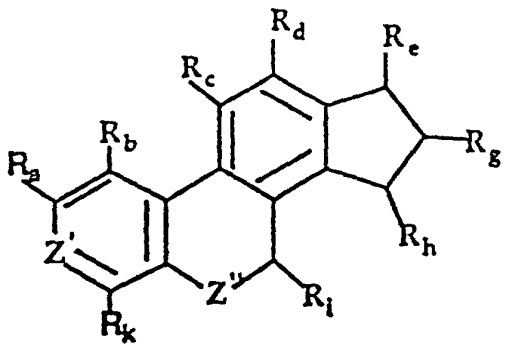
Z′ is >COH; and

Z" is $>CH_2$;

then R_a is not -H;

where, in each formula set forth above, each R_1 and R_2 independently is -H, or substituted or unsubstituted alkyl, alkenyl or alkynl group of 1-6 carbons.

2. A method for treating a mammalian disease characterized by abnormal cell mitosis, said method comprising administering to a mammal a cell-mitosis-inhibiting compound of the formula below, said compound being administered in an amount sufficient to inhibit cell mitosis:



wherein:

I. R_a-R_k are defined as follows:

A) each R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_e is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$ or $-C\equiv CH$;

or

B) each R_a, R_b, R_c, R_d, R_k, independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and each R_{eg}, R_h, R_i, independently is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-Br$, or $-I$; and R_e is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-Br$, $-I$ or $-C\equiv CH$;

and

II. Z′ is defined as follows:

A) Z′ is X, where X is $>COR_1$, $>C\overset{O}{\overset{\|}{C}}-R_1$, $>C\overset{O}{\overset{\|}{C}}-OR_1$, $>C\overset{OH}{\overset{|}{C}}-R_1$, $>C\overset{OH}{\overset{|}{C}}-C-OR_1$;

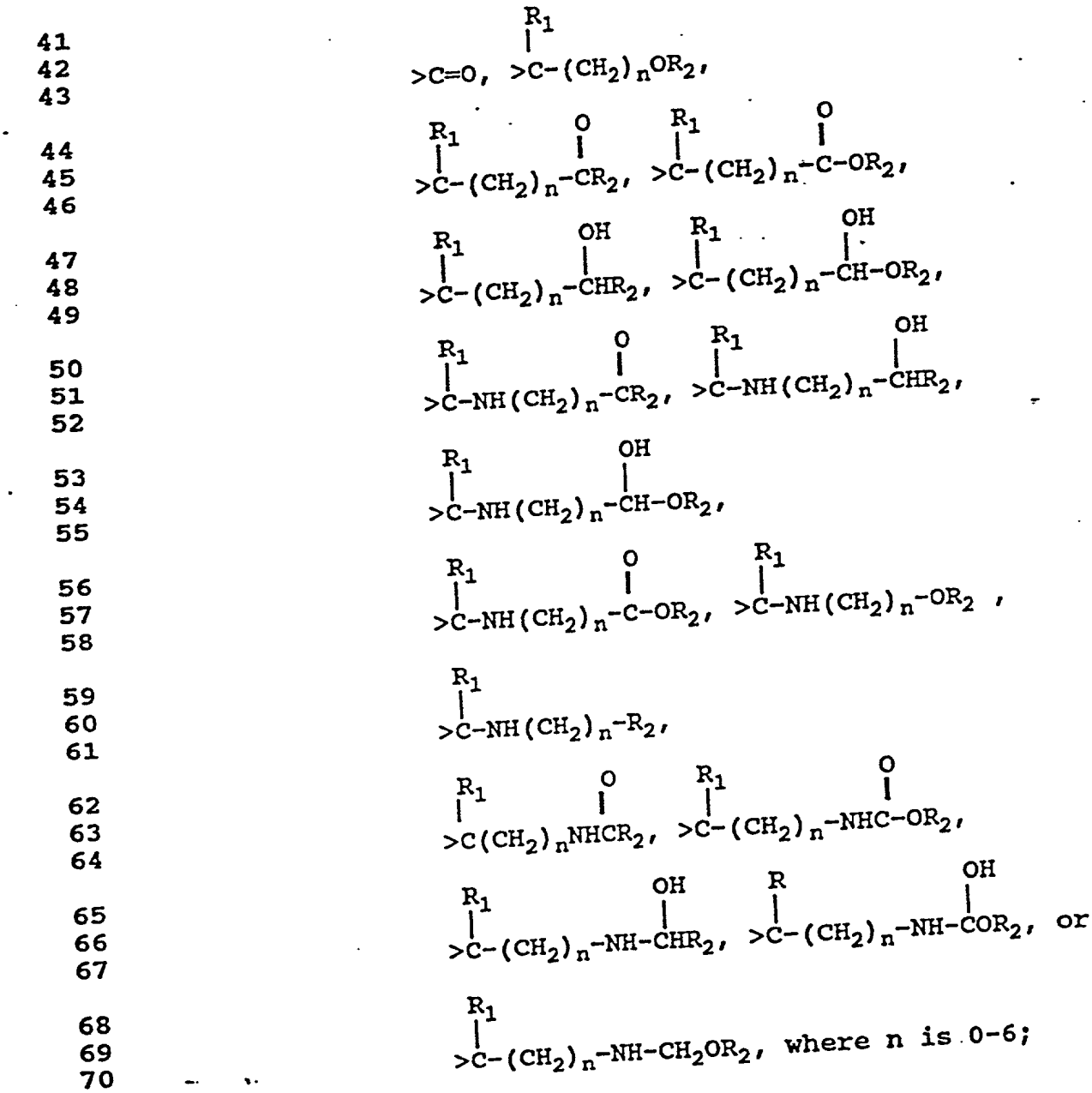
or

B) Z′ is $=C(R_n)-X'-$ or $-X'-C(R_n)=$, where R_n is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$, and X′ is X, as defined above; or X′ is also $>C=O$;

and

III. Z″ is defined as follows:

A) Z″ is Y, where Y is $-O-$, $-\overset{R_1}{\overset{|}{N}}-$, $>CHR_1$,



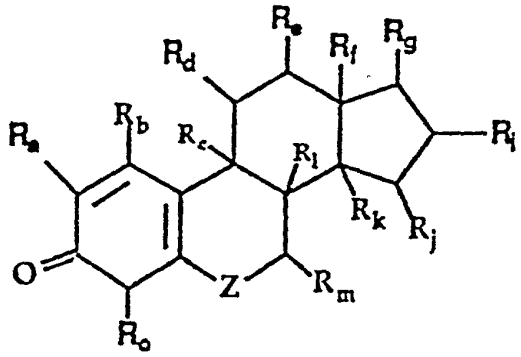
or

B) Z" is $-Y-\underset{R_p}{CH}-$ or $-\underset{R_p}{CH}-Y-$, where R_p is

$-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;

where, in each formula set forth above, each R_1 and R_2 independently is -H, or substituted or unsubstituted alkyl, alkenyl or alkynl group of 1-6 carbons.

3. A method for treating a mammalian disease characterized by abnormal cell mitosis, said method comprising administering to a mammal a cell-mitosis-inhibiting compound of the formula below, said compound being administered in an amount sufficient to inhibit cell mitosis:



wherein:

I. R_a-R_o are defined as follows:

A) each R_a, R_b, R_c, R_d, R_e, R_f, R_i, R_j, R_k, R_l, R_m, R_o independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_2$, -Br, or -I; and R_g is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_2$, -Br, -I or $-C\equiv CH$;

or

B) each R_a, R_b, R_c, R_f, R_k, R_1, independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and each R_d, R_e, R_i, R_j, R_m, R_o independently is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_g is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$ or $-C\equiv CH$;

and

II. Z is defined as follows:

A) Z is Y, where Y is $-O-$, $-\overset{R_1}{\underset{|}{N}}-$, $>CHR_1$,

$>C=O$, $>\overset{R_1}{\underset{|}{C}}-(CH_2)_nOR_2$,

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{O}{\overset{\|}{C}}-CR_2$, $>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{O}{\overset{\|}{C}}-OR_2$,

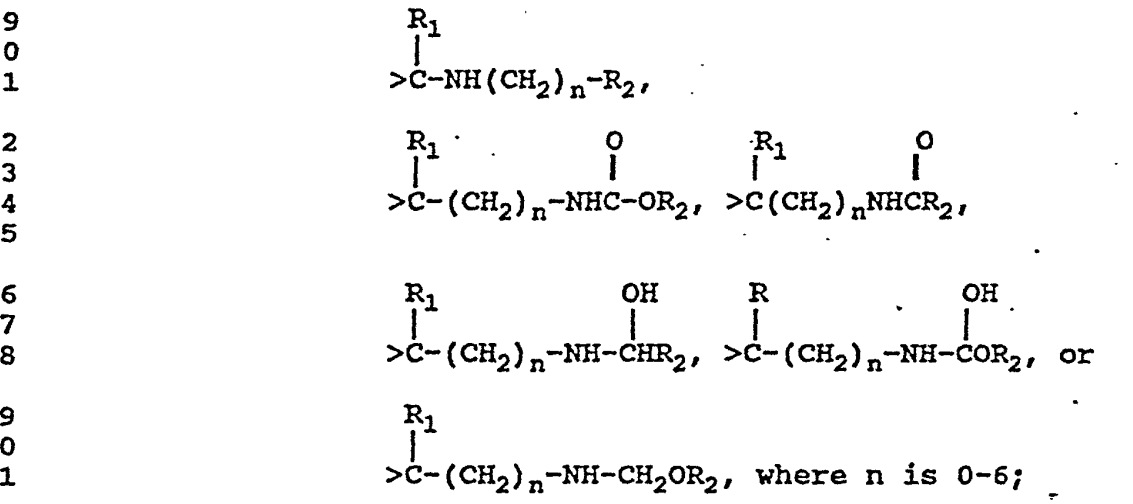
$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{OH}{\underset{|}{C}}HR_2$,

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{OH}{\underset{|}{C}}H-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{O}{\overset{\|}{C}}-CR_2$, $>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{OH}{\underset{|}{C}}HR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{OH}{\underset{|}{C}}H-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{O}{\overset{\|}{C}}-OR_2$, $>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-OR_2$,

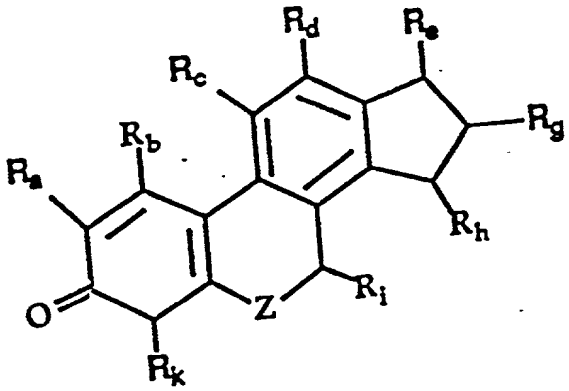


or

B) Z is $-Y-\underset{\underset{R_n}{|}}{CH}-$ or $-\underset{\underset{R_n}{|}}{CH}-Y-$, where R_n is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;

where, in each formula set forth above, each R_1 and R_2 independently is -H, or substituted or unsubstituted alkyl, alkenyl or alkynl group of 1-6 carbons.

4. A method for treating a mammalian disease characterized by abnormal cell mitosis, said method comprising administering to a mammal a cell-mitosis-inhibiting compound of the formula below, said compound being administered in an amount sufficient to inhibit cell mitosis:



wherein:

I. R_a-R_k are defined as follows:

A) each R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, or $-I$; and R_e is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

or

B) each R_a, R_b, R_c, R_d, independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, or $-I$ and each R_g, R_h, R_i, R_k independently is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$ or $-I$; and R_e is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

and

II. Z is defined as follows:

A) Z is Y, where Y is $-O-$, $-\overset{R_1}{\underset{|}{N}}-$, $>CHR_1$,

$>C=O$, $>\overset{R_1}{\underset{|}{C}}-(CH_2)_nOR_2$,

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{O}{\overset{\|}{C}}-R_2$, $>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{O}{\overset{\|}{C}}-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{OH}{\underset{|}{C}}HR_2$, $>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{OH}{\underset{|}{C}}H-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{O}{\overset{\|}{C}}-R_2$, $>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{OH}{\underset{|}{C}}HR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{OH}{\underset{|}{C}}H-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{O}{\overset{\|}{C}}-OR_2$, $>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-R_2$, $>\overset{R_1}{\underset{|}{C}}(CH_2)_nNH\overset{O}{\overset{\|}{C}}R_2$,

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-NH\overset{O}{\overset{\|}{C}}-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-NH-\overset{OH}{\underset{|}{C}}HR_2$, $>\overset{R}{\underset{|}{C}}-(CH_2)_n-NH-\overset{OH}{\underset{|}{C}}OR_2$, or

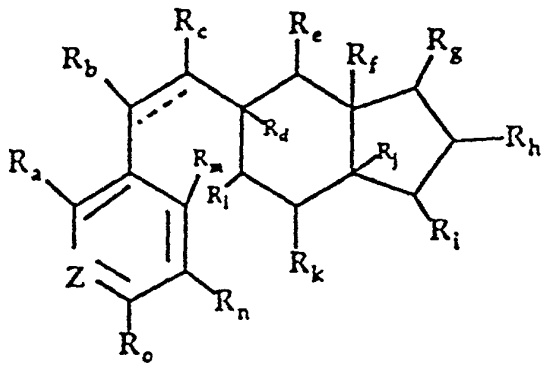
$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-NH-CH_2OR_2$, where n is 0-6;

or

B) Z is $-Y-\overset{R_n}{\underset{|}{C}}H-$ or $-\overset{R_n}{\underset{|}{C}}H-Y-$, where R_n

is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$; where, in each formula set forth above, each R_1 and R_2 independently is -H, or substituted or unsubstituted alkyl, alkenyl or alkynl group of 1-6 carbons.

5. A method for treating a mammalian disease characterized by abnormal cell mitosis, said method comprising administering to a mammal a cell-mitosis-inhibiting compound of the formula below, said compound being administered in an amount sufficient to inhibit cell mitosis:



wherein:

I. R_a-R_o are defined as follows:

A) each R_a, R_b, R_c, R_d, R_e, R_f, R_g, R_h, R_j, R_k, R_l, R_m, R_n, R_o independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_i is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$ or $-C\equiv CH$;

or

B) each R_a, R_d, R_f, R_j, R_m, R_n, R_o independently is $-R_1$, $-OR_1$, $-OCR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and each R_b, R_c R_e, R_g, R_h, R_k, R_l independently is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$ or $-I$; and R_i is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-Br$, $-I$ or $-C\equiv CH$;

or

C) each R_a, R_b, R_c, R_d, R_f, R_j, R_m, R_n, R_o independently is $-R_1$, $-OR_1$, OCR_1, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$ and each R_e, R_g, R_h, R_k, R_l independently is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$ or $-I$; and R_i is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-Br$, $-I$ or $-C\equiv CH$;

II. Z is defined as follows:

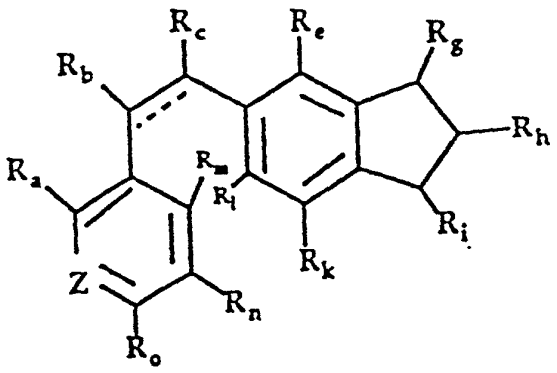
A) Z is X, where X is $>COR_1$, $>CC(=O)-R_1$, $>CC(=O)-OR_1$, $>CC(OH)-R_1$, $>CC(OH)-OR$;

or

B) Z is $=C(R_p)-X'-$ or $-X'-C(R_p)=$, where R_p is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$; and X' is X, as defined above; or X' is >C=O;

where, in each formula set forth above, each R_1 and R_2 independently is -H, or substituted or unsubstituted alkyl, alkenyl or alkynl group of 1-6 carbons; and the bond indicated by C•••C is absent or, in combination with the C—C bond, is the unit HC=CH.

6. A method for treating a mammalian disease characterized by abnormal cell mitosis, said method comprising administering to a mammal a cell-mitosis-inhibiting compound of the formula below, said compound being administered in an amount sufficient to inhibit cell mitosis:



wherein:

I. R_a-R_o are defined as follows:

A) each R_a, R_b, R_c, R_e, R_g, R_h, R_k, R_l, R_m, R_n, R_o independently is $-R_1$, $-OR_1$, $-OCOR_i$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_i is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$ or $-C\equiv CH$;

or

B) each R_a, R_e, R_l, R_m, R_n, R_o independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$ and each R_b, R_c, R_g, R_h is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$ or $-I$; and R_i is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

or

C) each R_a, R_b, R_c, R_e, R_k, R_m, R_n, R_o independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$, and each R_h, R_i independently is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$ or $-I$; and R_i is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

and

I. Z is defined as follows:

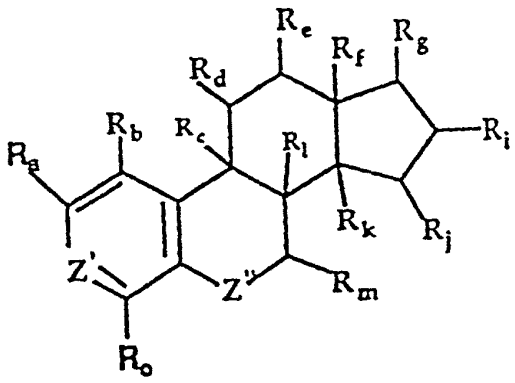
A) Z is X, where X is $>COR_1$, $>CC(=O)-R_1$, $>CC(=O)-OR_1$, $>CC(OH)-R_1$, $>CC(OH)-OR$;

or

B) Z is $=C(R_p)-X'-$ or $-X'-C(R_p)=$, where R_p is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$, and X′ is X, as defined above; or X′ is =O;

where, in each formula set forth above, each R_1 and R_2 independently is -H, or substituted or unsubstituted alkyl, alkenyl or alkynl group of 1-6 carbons; and the bond indicated by C•••C is absent or, in combination with the C–C bond is the unit HC=CH.

7. A compound of the general formula below, said compound being a cell-mitosis-inhibiting compound:



wherein:

I. R_a-R_o are defined as follows:

(A) each R_a, R_b, R_c, R_d, R_e, R_f, R_i, R_j, R_k, R_l, R_m, R_o, independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_2$, -Br, or -I; and R_g is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_2$, -Br, -I or $-C\equiv CH$;

or

(B) each R_a, R_b, R_c, R_f, R_k, R_l, R_o, is $-R_1$, $-OR_1$, $-OCOR_1$ $-SR_1$, -F, $-NHR_2$, -Br, or -I; and each R_d, R_e, R_i, R_j, R_m, independently is =O, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_2$, -Br or -I; and R_g is =O, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_2$, -Br, -I or $-C\equiv CH$;

and

II. Z′ is defined as follows:

A) Z′ is X, where X is $>COR_1$, $>C(=O)-R_1$, $>C(=O)-OR_1$, $>C(OH)-R_1$, $>C(OH)-OR_1$;

or

B) Z′ is $=C(R_n)-X'-$ or $-X'-C(R_n)=$, where R_n is $-R_1$, $-OR_1$, $-SR_1$, -F, $-NHR_2$, -Br or -I; or X′ is X, as defined above; or X′ is >C=O;

and

III. Z" is defined as follows:

A) Z" is Y, where Y is -O-, $-\overset{R_1}{\underset{|}{N}}-$, $>CHR_1$,

$>C{=}O$, $>\overset{R_1}{\underset{|}{C}}-(CH_2)_nOR_2$,

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{O}{\overset{\|}{C}}-R_2$, $>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{O}{\overset{\|}{C}}-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{OH}{\underset{|}{C}}HR_2$, $>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{OH}{\underset{|}{C}}H-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{O}{\overset{\|}{C}}-R_2$, $>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{OH}{\underset{|}{C}}HR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{OH}{\underset{|}{C}}H-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{O}{\overset{\|}{C}}-OR_2$, $>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-OR_2$

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-R_2$, $>\overset{R_1}{\underset{|}{C}}(CH_2)_nNH\overset{O}{\overset{\|}{C}}R_2$,

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-NH\overset{O}{\overset{\|}{C}}-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-NH-\overset{OH}{\underset{|}{C}}HR_2$, $>\overset{R}{\underset{|}{C}}-(CH_2)_n-NH-\overset{OH}{\underset{|}{C}}OR_2$, or

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-NH-CH_2OR_2$, where n is 0-6;

or

B) Z" is $-Y-\overset{R_p}{\underset{|}{C}}H-$ or $-\overset{R_p}{\underset{|}{C}}H-Y-$ where R_p

is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;

provided that when:

3) each R_b, R_c, R_d, R_e, R_j R_k, R_l, R_m, is $-H$;
R_f is $-CH_3$;
R_g is $-OH$, $-OCCH_3$ (with O);
R_i is $-H$, $-OH$, or $=O$;
R_o is $-H$ or $-Br$;
Z' is $>COH$; and
Z'' is $>CH_2$ or $-OH$; then
R_a is not $-F$, $-Br$, $-OH$ or $-H$;

and

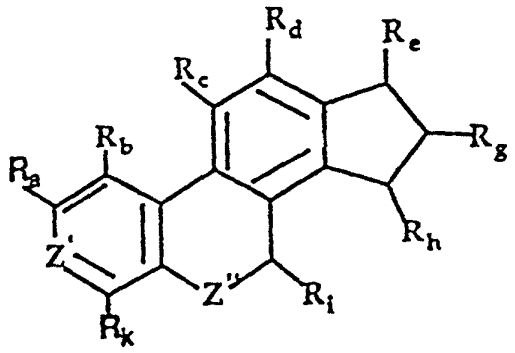
4) each R_b, R_c, R_d, R_e, R_i, R_j R_k, R_l,
R_m, is $-H$;
R_f is $-CH_3$;
R_g is $-OH$; and
Z'' is $>CH_2$; then
Z' is not $>COCH_3$ or $>COCCH_3$ (with O); and
each R_a, R_o independently or together are not $-OCH_3$ or $-H$;

and

5) each R_c, R_e, R_j, R_k, R_l, R_m, R_o is $-H$;
R_a is $-H$ or $-OCH_3$;
R_b is $-H$ or $-CH_3$;
R_d is $-OH$;
R_f is $-CH_3$;
R_g is $=O$;
R_i is $-OH$, $=O$ or $-C\equiv CH$; and
Z'' is $>CH_2$; then
Z' is not $>COH$; $>COCCH_3$, or $-H$;

where, in each formula set forth above, each R_1 and R_2 independently is -H, or substituted or unsubstituted alkyl, alkenyl or alkynl group of 1-6 carbons.

8. A compound of the general formula below, said compound being a cell-mitosis-inhibiting compound:



wherein:

I. R_a-R_k are defined as follows:

A) each R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_2$, -Br, or -I; and R_e is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_2$, -Br, -I or $-C\equiv CH$;

or

B) each R_a, R_b, R_c, R_d, R_k, is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_2$, -Br, or -I; and each R_g, R_h, R_i, independently is =O,

$-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-Br$, or $-I$;
and R_e is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-Br$, $-I$ or $-C\equiv CH$;

and

I. Z′ is defined as follows:

A) Z′ is X, where X is $>COR_1$, $>C_2C(=O)-R_1$,

$>C_2C(=O)-OR_1$, $>CC(OH)-R_1$, $>C(OH)-C-OR_1$;

or

B) Z′ is $=C(R_n)-X'-$ or $-X'-C(R_n)=$, where R_n is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$, and X′ is X, as defined above; or X′ is also $>C=O$;

and

II. Z" is defined as follows:

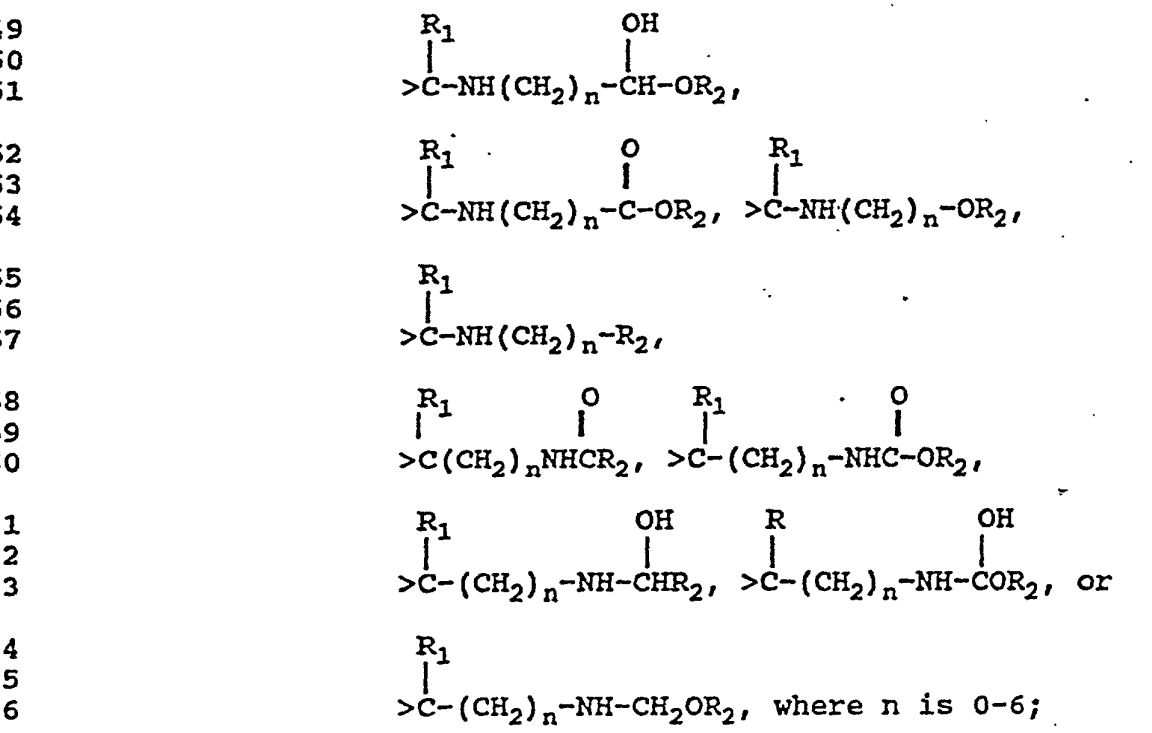
A) Z" is Y, where Y is $-O-$, $-N(R_1)-$, $>CHR_1$,

$>C=O$, $>C(R_1)-(CH_2)_nOR_2$,

$>C(R_1)-(CH_2)_n-C(=O)-R_2$, $>C(R_1)-(CH_2)_n-C(=O)-OR_2$,

$>C(R_1)-(CH_2)_n-CH(OH)-R_2$, $>C(R_1)-(CH_2)_n-CH(OH)-OR_2$,

$>C(R_1)-NH(CH_2)_n-C(=O)-R_2$, $>C(R_1)-NH(CH_2)_n-CH(OH)-R_2$,



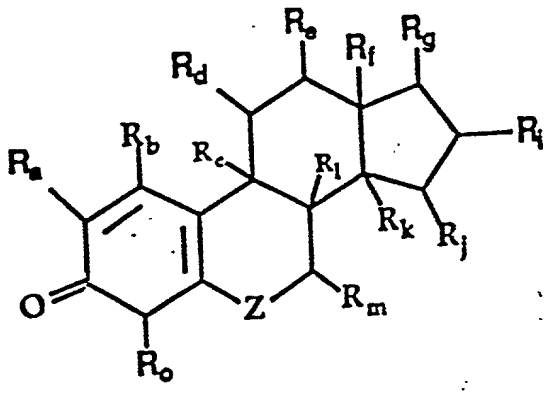
or

B) Z" is $-Y-\underset{\underset{R_p}{|}}{CH}-$ or $-\underset{\underset{R_p}{|}}{CH}-Y-$, where R_p is

$-R_1$, $-OR_1$, $-SR_1$, -F, $-NHR_2$, -Br or -I;

where, in each formula set forth above, each R_1 and R_2 independently is -H, or substituted or unsubstituted alkyl, alkenyl or alkynl group of 1-6 carbons.

9. A compound of the general formula below, said compound being a cell-mitosis-inhibiting compound:



wherein:

I. R_a-R_o are defined as follows:

A) each R_a, R_b, R_c, R_d, R_e, R_f, R_i, R_j, R_k, R_l, R_m, R_o independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_g is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$ or $-C\equiv CH$;

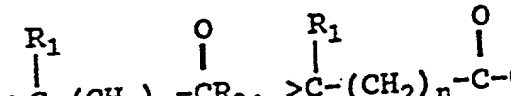
or

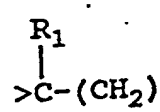
B) each R_a, R_b, R_c, R_f, R_k, R_l, independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and each R_d, R_e, R_i, R_j, R_m, R_o independently is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$; and R_g is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$ or $-C\equiv CH$;

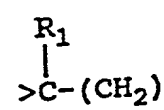
and

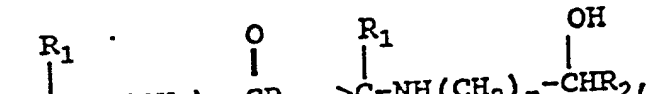
II. Z is defined as follows:

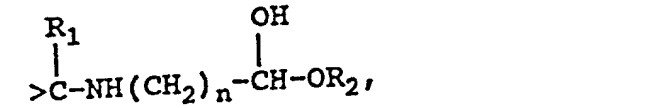
A) Z is Y, where Y is $-O-$, $-\overset{R_1}{\underset{|}{N}}-$, $>CHR_1$, $>C=O$, $>\overset{R_1}{\underset{|}{C}}-(CH_2)_nOR_2$,

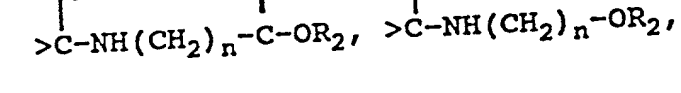


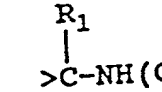


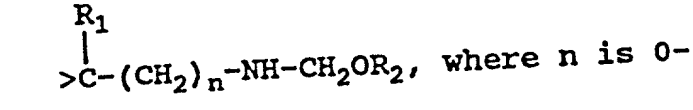




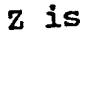
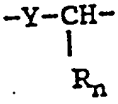






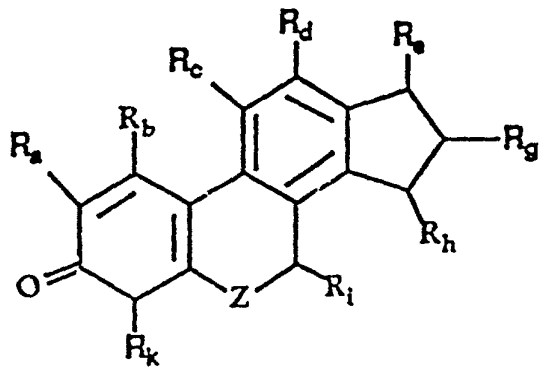


or

B) Z is  or  , where R_n is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;

where, in each formula set forth above, each R_1 and R_2 independently is -H, or substituted or unsubstituted alkyl, alkenyl or alkynl group of 1-6 carbons.

10. A compound of the general formula below, said compound being a cell-mitosis-inhibiting compound:



wherein:

I. R_a-R_k are defined as follows:

A) each R_a, R_b, R_c, R_d, R_g, R_h, R_i, R_k independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_1$, -Br, or -I; and R_e is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_1$, -Br, -I or -C≡CH;

or

B) each R_a, R_b, R_c, R_d, independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_1$, -Br, or -I; and each R_g, R_h, R_i, R_k independently is =O, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_1$, -Br or -I; and R_e is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, -F, $-NHR_1$, -Br, -I or -C≡CH;

II. Z is defined as follows:

1) Z is Y, where Y is -O-, $-\overset{R_1}{\underset{|}{N}}-$, $>CHR_1$,

$>C{=}O$, $>\overset{R_1}{\underset{|}{C}}-(CH_2)_nOR_2$,

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{O}{\overset{\|}{C}}R_2$, $>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{O}{\overset{\|}{C}}-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{OH}{\underset{|}{C}}HR_2$, $>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-\overset{OH}{\underset{|}{C}}H-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{O}{\overset{\|}{C}}R_2$, $>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{OH}{\underset{|}{C}}HR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{OH}{\underset{|}{C}}H-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-\overset{O}{\overset{\|}{C}}-OR_2$, $>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-NH(CH_2)_n-R_2$, $>\overset{R_1}{\underset{|}{C}}(CH_2)_nNHCR_2$

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-NHC(=O)-OR_2$,

$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-NH-\overset{OH}{\underset{|}{C}}HR_2$, $>\overset{R}{\underset{|}{C}}-(CH_2)_n-NH-\overset{OH}{\underset{|}{C}}OR_2$, or

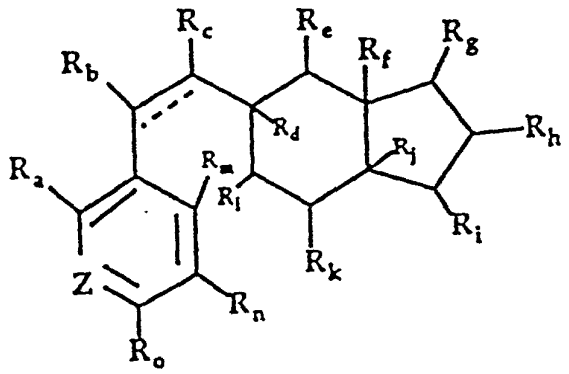
$>\overset{R_1}{\underset{|}{C}}-(CH_2)_n-NH-CH_2OR_2$, where n is 0-6;

or

Z is $-Y-\underset{R_n}{CH}-$ or $-\underset{R_n}{CH}-Y-$, where R_n is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$;

where, in each formula set forth above, each R_1 and R_2 independently is -H, or substituted or unsubstituted alkyl, alkenyl or alkynl group of 1-6 carbons.

11. A compound of the general formula below, said compound being a cell-mitosis-inhibiting compound:



wherein:

I. R_a-R_o are defined as follows:

A) each R_a, R_b, R_c, R_d, R_e, R_f, R_g, R_h, R_j, R_k, R_l, R_m, R_n, R_o independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_i is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$ or $-C\equiv CH$;

or

B) each R_a, R_d, R_f, R_j, R_m, R_n, R_o independently is $-R_1$, $-OR_1$, $-OCR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$; and each R_b, R_c, R_e, R_g, R_h, R_k, R_l independently is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$ or $-I$; and R_i is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

or

C) each R_a, R_b, R_c, R_d, R_f, R_j, R_m, R_n, R_o independently is $-R_1$, $-OR_1$, OCR_1, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$; and each R_e, R_g, R_h, R_k, R_l independently is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$ or $-I$; and R_i is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

and

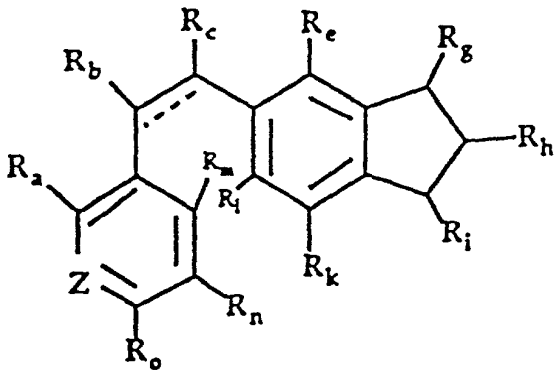
I. Z is defined as follows:

1) Z is X, where X is $>COR_1$, $>\overset{\displaystyle O}{\overset{\|}{C}}-R_1$, $>\overset{\displaystyle O}{\overset{\|}{C}}-OR_1$, $>\overset{\displaystyle OH}{\overset{|}{C}}-R_1$, $>\overset{\displaystyle OH}{\overset{|}{C}}-OR$; or

Z is $=C(R_p)-X'-$ or $-X'-C(R_p)=$, where R_p is $-R_1$, $-OR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$ or $-I$; and X′ is X, as defined above; or X′ is >C=O;

where, in each formula set forth above, each R_i and R_2 independently is -H, or substituted or unsubstituted alkyl, alkenyl or alkynl group of 1-6 carbons; and the bond indicated by C•••C is absent or, in combination with the C—C bond is the unit HC=CH.

12. A compound of the general formula below, said compound being a cell-mitosis-inhibiting compound:



wherein:

I. R_a-R_o are defined as follows:

A) each R_a, R_b, R_c, R_e, R_g, R_h, R_k, R_l, R_m, R_n, R_o independently is $-R_1$, $-OR_1$, $OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, or $-I$; and R_i is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$ or $-C\equiv CH$;

or

B) each R_a, R_e, R_l, R_m, R_n, R_o independently is $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$; and each R_b, R_c, R_g, R_h is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$ or $-I$; and R_i is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

or

C) each R_a, R_b, R_c, R_e, R_k, R_m, R_n, R_o independently is $-R_1$, $-OR_1$, $OCOR_1$, $-SR_1$, $-F$, $-NHR_2$, $-Br$, $-I$; and each R_g, R_h independently is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$ or $-I$; and R_i is $=O$, $-R_1$, $-OR_1$, $-OCOR_1$, $-SR_1$, $-F$, $-NHR_1$, $-Br$, $-I$ or $-C\equiv CH$;

and

II. Z is defined as follows:

A) Z is X, where X is $>COR_1$, $>C(O)-R_1$, $>C(O)-OR_1$, $>C(OH)-R_1$, $>C(OH)-OR$;

or

B) Z is $=C(R_p)-X'-$ or $-X'-C(R_p)=$, where R_p

is $-R_1$, $-OR_1$, $-SR_1$, -F, $-NHR_2$, -Br or -I, and X′ is X, as defined above; or X′ is =O;

where, in each formula set forth above, each R_1 and R_2 independently is -H, or substituted or unsubstituted alkyl, alkenyl or alkynl group of 1-6 carbons; and the bond indicated by C•••C is absent or, in combination with the C—C bond is the unit HC=CH.

13. The method of claim 1, wherein said cell-mitosis-inhibiting composition is 2-methoxyestradiol.

14. The method of claim 1, wherein said cell-mitosis-inhibiting composition is 2-fluoroestradiol.

15. The method of claim 1, wherein said cell-mitosis-inhibiting composition is 2-bromoestradiol.

16. The method of claim 1, wherein said cell-mitosis-inhibiting composition is 2-methoxyestrone.

17. The method of claim 1, wherein said cell-mitosis-inhibiting composition is 17-ethynylestradiol.

18. The method of claims 1 or 2 wherein said compound is further characterized in that

A) Z′ is $=C(R_n)-X'-$ or $-X'-C(R_n)=$; and

Z" is $-Y-CH(R_p)-$ or $-CH(R_p)-Y-$; or

B) Z′ is X; and Z" is $-Y-CH(R_p)-$ or $-CH(R_p)-Y-$; or

C) Z′ is $=C(R_n)-X'-$ or $-X'-C(R_n)=$; and Z" is Y.

19. The method of claims 3 or 4 wherein said compound is further characterized in that Z is $-Y-CH(R_n)-$ or $-CH(R_n)-Y-$.

20. The method of claims 5 or 6 wherein said compound is further characterized in that Z is $=C(R_p)-X'-$ or $-X'-C(R_p)=$.

21. The compound of claims 7 or 8, wherein said compound is further characterized in that

A) Z′ is $=C(R_n)-X'-$ or $-X'-C(R_n)=$; and

Z" is $-Y-CH(R_p)-$ or $-CH(R_p)-Y-$; or

B) Z′ is X; and Z" is $-Y-CH(R_p)-$ or $-CH(R_p)-Y-$; or

C) Z′ is $=C(R_n)-X'-$ or $-X'-C(R_n)=$; and Z" is Y.

22. The compound of claims 9 or 10, wherein said compound is further characterized in that Z is $-Y-CH(R_n)-$ or $-CH(R_n)-Y-$.

23. The compound of claims 11 or 12, wherein said compound is further characterized in that Z is

$$=C(R_p)-X'- \text{ or } -X'-C(R_p)=.$$

24. The method of any one of claims 1-6, wherein at least one of $R_a \rightarrow R_p$ is $-OCH_3$.

25. The compound of any one of claims 7-12, wherein at least one of $R_a \rightarrow R_p$ is $-OCH_3$.